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ABSTRACT

The development of an innovative approach to the improvement of college teaching is described. The main objective was to develop a practical diagnostic observation and reporting system for student description of college teaching. A total of 120 professors participated in identifying seven general teaching objectives considered satisfactory for describing undergraduate course objectives. Data were also collected from 402 instructors and 12,792 students at 10 agriculture colleges in the Northeast to determine the correlations between the presence of 45 low-inference teaching behaviors and the degree of student achievement as measured by students' ratings of their progress on each of the seven general teaching objectives. The findings show that 28 specific, low-inference, observable teaching behaviors correlated at the level of .48 or higher with student achievement on one or more of the general teaching objectives and were classified by the researchers as effective at the college level . Four main products were generated by the study: an Instructor Form, a Student Form, a computer Instructor's Printout, and the required computer programs for use in processing the data on standard electronic equipment. These products are applicable for staff development programs. (Author/LBH)

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The Cornell Diagnostic Observation and Reporting System for Student Description of College Teaching

F. K. T. Tom* and H. R. Cushman†

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I. Summary

This project was devoted essentially to the development of an innovative approach to the improvement of college teaching. Specifically, the main objective was to develop a practical diagnostic observation and reporting system for student description of college teaching. At Cornell University 120 professors participated in identifying 7 general teaching objectives considered satisfactory for describing the objectives of undergraduate courses. In addition, data were collected from 402 instructors and 12,792 students at ten colleges of agriculture in the Northeast to determine the correlations between the presence of 45 low-inference teaching behaviors and the degree of student achievement as measured by students' ratings of their progress on each of the 7 general teaching objectives used in the study.

The findings show that 28 specific, low-inference, observable teaching behaviors correlated at the level of .48 or higher with student achievement on one or more of the general teaching objectives and were classified by the researchers as effective at the college level.

Four main products were generated by the study: an *Instructor Form*, a *Student Form*, a computer *Instructor's Printout*, and the required computer programs for use in processing the data on standard electronic equipment. Administrators and professors interested in the improvement of college teaching will find these products to have implications for meaningful staff development programs. Similarly, researchers seeking to validate competencies for inclusion in a competency-based teacher preparation program will find the rationale and methodology used in this study of benefit.

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II. Introduction

A. Problem

The goal of this research was development of a progressive approach for the improvement of college teaching. Traditional attempts have done little to diminish the need for a system that would: (1) draw its impetus from a joint effort by students, faculty, and administration; (2) derive its synthesis from the most relevant research findings available; (3) establish benchmarks descriptive of the state of the art; and (4) provide a rationale for exploitation of the many resources available for improving instruction. This study dealt with the beginnings in the evolution of such a system.

One of the most vital concerns of universities throughout the world during the next decade will be to teach students how to use the vast volume of new knowledge becoming available at an accelerating rate. Faculty members will have to be technically competent in their respective fields of specialization, have a strong research orientation, and possess expertise in teaching. Institutions of higher learning have made great strides in upgrading the technical and research competencies of their faculties. However, the matter of improving college teaching, despite increasing concern on the part of administrators and students, has been attacked with much less vigor. In many instances, this situation is now further aggravated by decelerating or declining budgets. For these reasons the significance of effective instruction is becoming paramount and the need for improving the teaching effectiveness of college faculties more pressing.

Few efforts are made to improve college teaching mainly because no one in authority knows "what is going on." Even the most zealous of administrators hesitates to violate the taboos forbidding even a token invasion of the professor's classroom. For, as Calvin Lee has said, "The Dean is supposed to know but he isn't supposed to find out." Neither training nor experience lead an instructor to regularly diagnose her or his teaching behaviors in any systematic way. Furthermore, when the instructor does undertake self-evaluation she or he turns out to be an extremely biased observer (Centra, 1972). However, when feedback and interaction are readily accessible, the professor will change teaching behaviors (Centra, 1973). For various reasons, then, the student emerges as the only unencumbered member of the educational troika. Research has revealed that she or he is an accurate and well-qualified reporter, eager to improve the quality and relevance of college teaching – even when not invited to assist in doing so. Given the proper tools, the student will surely tell us what is going on.

These three premises, then, undergird the present effort: (1) the improvement of college teaching is a priority concern with a high payoff potential; (2) the teaching behaviors of college instructors can be modified when relevant feedback and interaction are provided; and (3) the college student is an accurate and well-qualified observer and reporter of the teaching behaviors of her or his instructors.

B. Objective

The purpose of this study was to develop a practical diagnostic observation and reporting system for student description of college teaching. This imposed upon the research team the task of synthesizing three vital components: (1) an instrument that students can use to describe the teaching behaviors of an instructor in terms of variables related to student achievement; (2) a means for ascertaining student achievement in a given class section; and (3) a "stand alone" computerized technique for summarizing feedback to the instructor appropriate for the diagnosis of her or his strengths and weaknesses and the prescription of appropriate remedies.

C. Survey of literature

1. *College students as observers and reporters of teaching behaviors of their instructors.* The considerable body of empirical evidence concerning college students as observers and reporters of the teaching behaviors of their professors indicates that student ratings have high reliability (Fahey, 1967, and Hoyt, 1969); are generally unrelated to a student's age, sex, military experience, past grades, the grade in the course she or he is rating, expected grade in that course, class standing, or personality characteristics (Remmers, 1930; Elliott, 1950; Voeks and French, 1960; Gavernick and Carter, 1962; and Costin et al., 1971); and usually agree closely with ratings made by the professor's peers (McKeachie, 1973). Although the student's ability to judge the instructor's mastery of the subject matter or the appropriateness of the topics included or omitted is questionable, there is less reason to be skeptical of student descriptions of the teacher's instructional methods, the degree of organization in presentation, speaking style, and effort to evoke class discussion. Solomon's work (1964) indicates that student reports give a fair representation of a teacher's classroom performance. Students can also provide useful feedback on whether they understand, are stimulated or bored, already know, are learning, are encountering roadblocks, and so on, (Johnson, 1967).

2. *Validity of student estimates of their own achievement.* Less evidence bears on the validity of student self-ratings. A number of studies have shown that student estimates of their probable grade point averages are about as predictive of first-year results as are college aptitude tests (Keefer, 1965). Other studies have shown that self-ratings of vocational interests are more predictive of future occupational choice than are interest test scores (Holland and Lutz, 1968). Still other studies show that the amount of distortion occurring in self-reports is minimal even when motivation to distort is considerable (Walsh, 1967; and the American College Testing Program, 1965). Solomon, Bez-

deck, and Rosenberg (1963) report a correlation of .52 between the actual gain (posttest scores minus pretest scores) of 24 college classes in American Government and student self-ratings of gain in factual knowledge; and a correlation of .57 between actual gain and student self-ratings of gain on knowledge of principles. Likewise, Gage et al. (1968) measuring the effectiveness of presentations in mini-lectures has shown that student's estimates of their "amount of learning" correlate quite highly (from .59 to .66) with actual scores on multiple-choice comprehension tests.

3. *Relevance of student observation and reporting systems to improvement of college teaching.* Hoyt (1969) has pointed out that a serious objection to existing student observation and rating systems concerns their relevance. He has warned researchers against basing the items to be used by students in rating their professors on "folklore" or concensus evidence that certain characteristics descriptive of the "model" teacher are related to student learning. If the researcher is to deserve the attention of the collegiate community, she or he must be prepared to show that student rating scales deal with those items of teaching behavior that the best evidence available suggests are related to positive learning outcomes.

Hoyt has also stressed that scholastic aptitude, previous achievement in the discipline and supporting disciplines, and academic motivation-persistence, taken together, account for such a significant proportion of the variation in student achievement that, unless they are controlled, variation due to the teaching behavior of the instructor is almost impossible to detect. In his work at Kansas State University, Hoyt (1) selected behavioral items (from limited sources) that research had shown to correlate with student achievement, (2) defined success in college teaching by student progress on objectives valued by the instructor, (3) measured "student achievement" by self-ratings of progress in a given course relative to progress the student had made in other courses at the same institution (to control for the factors previously mentioned), and (4) used correlation techniques to determine what specific instructional behaviors were related to student achievement. This work clearly outlined many of the essentials for coping with the relevance question.

A second weakness in existing student observation and rating systems lies in the failure of their authors to differentiate between the usefulness of low inference and high inference variables in describing teaching behaviors. Rosenshine (1971) has defined low inference items as those focusing upon specific, denoteable, relatively objective behaviors such as "teacher gesturing." High inference items lack the specificity of low inference variables. Items such as "enthusiasm" require that an observer infer these constructs from a series of events.

The concepts of low inference and high inference also have application in differentiating between, and interpreting the data obtained from, the alternative scaling systems that various researchers have provided for student recording of observations. Low inference scales enable the student to record her or his observations in specific, denoteable, and relatively objective terms (for example, yes or no). High inference scales limit the student to undefined, poorly defined, and less objective reporting (for example: Never 1 2 3 4 5 6 7 Frequently).

D. Rationale

The review of the literature indicated that available diagnostic observation and reporting systems for student description of college teaching had embodied a wide variety of features that seriously impaired their utility as means for the improvement of teaching. Operating from this base of dissatisfaction an attempt was made throughout this research to identify criteria of optimum utility that would provide a logical basis for the incorporation of specific features into the system. No claim is made for the originality of any of the ideas. Instead, uniqueness has been sought in their recombination into a more meaningful and useful whole. Together, this series of ideas constitutes the theoretical framework for the developmental effort. They are presented below under the major component of an observation and reporting system to which they are most intimately related.

1. *Observing and reporting "What is going on" in an instructor's classroom.* Any schema for observing and reporting the specific teaching behaviors of an instructor must satisfy at least the following requirements:

a. Focus on quantification of those observable teaching behaviors that research has shown to make a difference in student achievement.

b. The teaching behaviors to be observed and reported on are low inference.

c. The teaching behavior items are understood by the students and satisfy such criteria as: clarity (short, simple, unambiguous); variety; avoidance of ethical, moral, emotionally-loaded, good-bad cues; uniqueness; and avoidance of composites (compound ideas). The researcher is obligated to search out evidence concerning the "understandability" of items by the specific population who will use them for observation and reporting purposes.

d. The teaching behavior items are within the competence of students to observe and report. Again, this must not be assumed. Rather the researcher needs to establish such evidence for the items she or he plans to include.

e. The reliability of each item and that of the combined items is acceptable.

f. The schema uses extensive student classroom observation of the instructor over a period of time.

2. *Assessing student achievement.* Scholastic aptitude, previous achievement in the discipline and supporting disciplines, and academic motivation-persistence account for a significant portion of the variation in student achievement. Therefore, unless those variables are controlled, variation due to the teaching behaviors of the instructor may be obscured. Instructor grades, which incorporate all of

these variables and others, are particularly to be avoided as a measure of teaching effectiveness.

Hoyt's model, which was used in this study, is illustrative of one way to cope with this difficulty. The main features of this model are: (a) development of a list of general teaching objectives that the faculty endorse as being suitable for any course offered in the college, (b) measurement of the relative importance an instructor attaches to each objective for a given course, and (c) measurement of student achievement by means of self-ratings of progress on objectives valued by the instructor in a given course compared with progress made in other courses taken at the same college or university. By directing the student to use "self-comparisons" as a basis for assessing her or his progress, the effect of the aforementioned intervening variables can be minimized.

3. *Providing feedback to instructor to improve teaching.*

a. The feedback is diagnostic in nature. Diagnosis, in its generic useage, involves at least two actions on the part of the diagnostician: comparison of some aspect of an individual's condition, situation, or behavior with that of typical individuals drawn from the same population *and* pinpointing the specific ways in which she or he differs from such typical individuals. Information obtained from diagnosis provides a base of logic for prescription. Feedback on teaching behavior is presented in such a way that the instructor can see how she or he compares with other members of her or his peer group on specific items. This feedback enables the instructor to identify strengths and weaknesses.

b. The feedback system points out to the instructor either the specific prescription for overcoming weaknesses or at least identifies the area in which she or he needs prescription. Most patients (instructors) will not thank you for telling them they are sick. What they want and need is a prescription for overcoming their malaise.

c. Economy of time and effort requires that the capabilities of the computer be harnessed for both processing student responses and providing feedback to the instructor.

d. While the feedback system provides "stand-alone" diagnosis and prescription for a specific behavior it also has the potential for providing a description of the state of the art for a given faculty group and supplying a rationale for the exploitation of the many resources available for improving instruction.

III. Methodology

A. Development of the data collection instruments

1. *Identifying suitable general teaching objectives.* According to the rationale adopted for this study, a defensible measure of a student's achievement in a course is self-rating of progress in reaching objectives the instructor considers important. Thus, in the early stages of this investigation, general teaching objectives were identified.

Ten general teaching objectives evolved by Hoyt at Kansas State University were circulated to a randomly selected sample of 60, or approximately one-third of the instructors of undergraduate courses at the New York State College of Agriculture and Life Sciences, Cornell University, during the Fall term of 1973. Each faculty member was asked to accept, revise, add, or delete items to make them *understandable, comprehensive,* and *appropriate* for describing the important purposes of undergraduate courses in the College.

The feedback obtained was used to produce 7 revised objectives that were subsequently tested on a second randomly selected sample of 60 instructors who had not participated in the initial effort. These persons were asked (1) to rate the importance of the 7 general teaching objectives in their undergraduate courses using a five-point scale, and (2) to add any other purposes important in their own courses. The results of this testing procedure indicated that instructors had found (1) the revised 7 general objectives suitable for the stated intent and (2) the question soliciting the instructor's rating of the importance of each objective clearly stated.

2. *Developing the instructor form.* Having identified suitable general teaching objectives, the researchers incorporated them into a simple one-page form together with provisions for identification information (Appendix A).

3. *Identifying teaching behavior correlates of student achievement.* The computerized resources of the Educational Resource Information Center (the ERIC System) at North Carolina State University's Center for Occupational Education were used (1) to locate the titles of journal articles and completed research reports that dealt with teaching behaviors and student achievement at the college level, and (2) to provide abstracts of all available material. During 1972 and early 1973 numerous promising journal articles and research reports were studied in their entirety. However, this massive effort located only 27 teaching behaviors that correlated with student learning outcomes.

The review made by Rosenshine (1971) of some 50 studies of the effect of various teaching behaviors on student achievement at the primary and secondary level yielded an additional 18 teaching behaviors significantly related to student achievement at the .05 or higher level of statistical confidence.

Finally, 40 teaching behavior correlates of student achievement reported by Hoyt, Owens, and Grouling (1973) from data collected from 13,500 students enrolled in 400 classes during 1972–73 at Kansas State University were added to the above to form an initial pool of 85 teaching behaviors that other researchers had found were correlated with effective teaching.

Since the 85 teaching behaviors were worded by different researchers, it was not surprising that they did not all adhere to a given set of standards, a necessary condition for the pursuance of the present investigation. Thus, the

authors reviewed, revised, and synthesized the items in the initial pool using criteria previously presented in the *Rationale* section, that is, such guidelines as clarity, low inference, within the competence of students to observe and report, avoidance of ethical or moral cues, and so on. Seventy-two items survived the process, and these were pretested on 524 students enrolled in five large classes at the New York State College of Agriculture and Life Sciences at Cornell University. These students were asked to evaluate each item (1) in terms of its clarity and (2) in terms of their competence to observe and report the behavior dealt with by each item. Responses provided by the students together with persistent application of the item-writing criteria mentioned earlier reduced the number of remaining teaching behavior items to 45.

4. *Developing the student form.* By bringing together the 45 teaching behavior items and the earlier-described 7 general teaching objectives and adding suitable instructions, a student form was developed for use in collecting two types of essential data, (1) to what extent selected teaching behaviors were exhibited by instructors, and (2) the degree of student achievement as measured by students assessing their own progress in achieving objectives considered important by instructors. Later, by correlational techniques, it was planned that a measure of the relationship between each teaching behavior and each teaching objective would be established. See Appendix B for a copy of the *Student Form.* This form was designed to be used with a standard optical scanner answer sheet.

B. Collection of data

After the *Instructor Form* and the *Student Form* had been developed, the data were collected. The participation of the twelve colleges of agriculture in the Northeast was sought by a variety of means. Letters from the Director of Resident Instruction of the New York State College of Agriculture and Life Sciences at Cornell University were sent to his counterparts in the other eleven land-grant institutions calling attention to the current project. Personal visits were made by one or more of the researchers during late February and March of 1974 to nine of the colleges while the remaining three were solicited by mail. As a result of these efforts, the colleges of agriculture at ten universities cooperated in supplying data: University of Connecticut, Cornell University, Rutgers University, University of Maine, University of Maryland, University of New Hampshire, Pennsylvania State University, University of Rhode Island, University of Vermont, and the University of West Virginia. Although the University of Massachusetts had indicated an interest in cooperating in the study, subsequent unexplainable failure of the postal system prohibited participation.

Each participating college named a Campus Project Coordinator who, using materials developed and supplied by the researchers, organized and supervised the data collection effort on her or his campus, including arranging for someone other than the instructor of the course to follow standardized instructions and administer the forms in accordance with acceptable procedures.

The instructors on the various campuses who joined in this project did so voluntarily. This investigation involved 304 instructors teaching 402 different class sections in which 12,792 students supplied data (table 1). Some students were counted more than once when more than one of their instructors volunteered for the study. In return for their participation, each was promised a computer printout of the results obtained from her or his own students. Not shown in table 1 are the numbers of instructors and their students from sections of fewer than nine students. These sections were eliminated from the study because the investigators had decided to use section means as the statistical unit and feared that numbers smaller than ten would introduce a greater degree of instability than desirable.

Table 1. *Participants in the study*

Institution	*Instructors*	*Class sections*	*Students providing data*
		number	
1. University of Connecticut	14	16	574
2. Cornell University	77	114	3,758
3. University of Maine	51	74	1,974
4. University of Maryland	10	13	221
5. University of New Hampshire	18	21	887
6. Pennsylvania State University	61	70	2,642
7. University of Rhode Island	11	14	437
8. Rutgers University	33	46	1,077
9. University of Vermont	19	23	901
10. West Virginia University	10	11	321
Total	304	402	12,792

C. Treatment of data

1. *Ascertaining importance attributed to the 7 general teaching objectives by participating instructors.* Each instructor was requested to rate each of the 7 general teaching objectives on its importance for a given section of her or his class; that is, for each lecture, discussion, and laboratory section. Shown below is the rating scale used together with the numerical value of each rating:

Scale	*Numerical value*
A. Not important	1
B. Of no more than minor importance	2
C. Important	3
D. Very important	4
E. Absolutely essential	5

The value of each of the five ratings was multiplied by the number of instructors who gave the objective that particular rating and the cross-products added. This sum was then divided by the number of instructors involved for a numerical mean rating, a measure of the importance at-

tributed to the 7 general objectives by the participating instructors.

2. *Determining the relationship between teaching behaviors and student achievement.* One of the most important desired outcomes of the data collection effort was the determination of which teaching behaviors correlated highly enough with student achievement to warrant being classified by the researchers as effective teaching behaviors at the college level. Toward this end, the following procedures were implemented:

a. For each of the 45 teaching behavior items, a mean rating score was computed for each of the 402 sections in the sample by taking the sum of all the rating scores assigned by the students in a given section and dividing by the number of students concerned.

b. For each of the 7 general teaching objectives, a mean rating score was computed for each of the 402 sections in the sample.

c. A Pearson Product-Moment Correlation was computed between each of the mean rating scores for the 45 teaching behaviors and each of the 7 general teaching objectives mean rating scores for a total of 315 correlation coefficients. Each correlation was computed using mean ratings from 402 class sections. Teaching behavior items were considered *effective* or *ineffective* based on these coefficients. See the section *Findings and Results* for the correlations.

3. *Deciding which teaching behaviors were effective.* In correlational studies of this type, one cannot determine empirically what size a correlation coefficient must be for it to be considered acceptable. The decision is simply a value judgment of the persons concerned. In this investigation, to be considered *effective* a teaching behavior had to be correlated with one or more general teaching objectives at the level of at least .48. This figure was selected because, given the size of the sample (402) a correlation coefficient of .48 means if the study were repeated with another sample of the same size drawn from a similar population, the chances of obtaining a correlation as high as .40 would be 97½ out of 100. In other words, by using a cut-off score of .48, the investigators were assured that upon replication, the results obtained would be *no lower than .40,* which was considered to be acceptably high for the purpose of this study. See table 3 for the 28 teacher behavior items that survived this screening process.

4. *Determining reliability of surviving items.* The inter-rater reliability method was used. Correlation coefficients were computed as follows: the 402 class sections in the sample were divided into five groups consisting of the 80 smallest sections, the 80 next largest sections, and so on; for each group, for each of the 28 teacher behavior items and 7 general teaching objectives, a reliability coefficient was calculated by arranging the student forms in random order, numbering them consecutively, sorting them into an even-numbered and an odd-numbered group, and obtaining a mean score for the given item for both groups; and then determining the Pearson Product-Moment Correlation between the two sets of mean scores for all the sections in the group. The obtained value, being a "split-half" correlation, was adjusted upward, using the standard formula: adjusted correlation equals 2 times the split-half correlation divided by the sum of 1 plus the split-half correlation. The resultant adjusted correlations showed the inter-rater reliability of *each* of the individual 28 teacher behavior items and 7 general teaching objectives. To obtain a measure of the reliability of the two types of items in the instrument, that is, the teacher behavior items and the student progress ratings, the adjusted correlations of the items in each type were averaged using an r to Z transformation. See tables 5 and 6 for reliability data.

5. *Testing the validity of student progress ratings.* Are student ratings of their progress a valid measure of student achievement? Hoyt (1969) reasoned that students should make more progress in achieving objectives that their instructors had considered important and less progress in achieving those considered unimportant. In other words, if the criterion of student achievement is valid, it should correlate positively with the instructor's rating of the importance of given objectives. The pertinent question becomes, "With respect to each of 7 general teaching objectives, what is the correlation between *student self-ratings* of their progress and instructor's ratings of importance of those objectives?" To determine this, the mean of student progress on each objective was correlated with the corresponding instructor's rating for each of the 402 class sections. The magnitude of the correlations served as an indirect measure of the validity of student progress ratings as a measure of achievement (table 7).

6. *Developing norm tables.* For the sake of simplicity, tables are provided showing the equivalent mean score for each of only 13 given percentile ranks for the normative data collected (tables 8 and 9). Thus, for each class section in which the instructor had rated an objective important, very important, or absolutely essential, the average student rating of progress made on that objective and the average score of each effective teacher behavior item for that objective were computed and arrayed in a frequency table showing mean score, raw frequency, and cumulative frequency. Then, using the following formula, the mean score for each of the desired 13 percentile ranks was determined.

$$P_p = l + \left(\frac{pN - F}{f_p}\right) \times i$$

Where:

- p = percentage of the distribution wanted,
- P_p = percentile, or desired score, below which are the scores of the percentage of the distribution wanted,
- l = exact lower limit of the class interval upon which P lies, below the score interval containing the pN frequency,

pN = part of N to be counted off in order to reach P_p,

F = sum of all scores upon intervals below l,

f_p = number of scores within the interval upon which P_p falls,

i = length of the class interval, (this interval is 0.1 since it was decided to round off scores to *one* decimal place).

7. *Developing computer capability to determine percentile rank of any mean score.* After the completion of the present study, we anticipated a need for computer capability of reporting an instructor's percentile rank for each of the mean scores assigned by her or his students. Therefore, following the development of a frequency table as described above an equivalent percentile rank was computed according to the following formula and stored in the computer:

$$PR = \frac{\text{Cum. } f + \frac{1}{2}f}{N} \times 100$$

Where:

PR = percentile rank,

cum. f = cumulative frequency of all cases below the score in question, and

f = number of cases having the score in question.

For any item on the student form it is possible to determine an instructor's percentile rank automatically by directing the computer to look up the score in storage and read off the corresponding percentile rank, doing linear interpolation in those rare cases where a particular raw score was not already in the table of stored data.

IV. Findings and Resulting Products

A. Importance attached to the 7 general teaching objectives by participating instructors

"Learning fundamental principles, concepts, or theories" was considered an important, very important, or absolutely essential general teaching objective by the instructors of 93 percent of the 402 class sections participating in the study (table 2). Three other general teaching objectives were similarly endorsed by the instructors of 88 percent of the classes. They were: "gaining factual knowledge . . . ," "improving logical thinking, problem-solving, and decision-making abilities," and "developing a favorable attitude toward the subject matter."

The additional general teaching objectives were described as important, very important, or absolutely essential by the instructors in a majority of the 402 class sections: "developing skills in organizing ideas and presenting them in written and oral form," 69 percent; and "developing creative . . . capabilities," 64 percent.

"Developing specific psychomotor . . . skills" proved to be an important, very important, or absolutely essential general objective in only 34 percent of the class sections.

Table 2. *Instructors' ratings of importance of 7 general teaching objectives (N = 402 Classes)*

General teaching objectives	*Percent of instructors who rated**					*Total 3,4,5*	*Mean rating*	*Standard deviation*
	1	*2*	*3*	*4*	*5*			
1. Gaining factual knowledge (terminology, classifications, methods, trends)	3	9	27	32	29	88	3.8	1.0
2. Learning fundamental principles, concepts, or theories	3	4	19	32	42	93	4.0	1.0
3. Improving logical thinking, problem-solving, and decision-making abilities	3	9	29	35	24	88	3.7	1.0
4. Developing specific psychomotor (manipulative, manual) skills	48	18	15	7	12	34	2.2	2.0
5. Developing a favorable attitude toward the subject matter	1	11	32	36	20	88	3.6	0.9
6. Developing creative (imaginative, inventive, original) capabilities	13	23	31	21	12	64	3.0	1.2
7. Developing skills in organizing ideas and presenting them in written and oral form	13	18	32	22	15	69	3.1	1.2

* *Key to instructors' ratings:*
Not important = 1
Of no more than minor importance = 2
Important = 3
Very important = 4
Absolutely essential = 5

B. Teaching behavior correlates of student achievement on 7 general teaching objectives

1. *Gaining factual knowledge (terminology, methods, trends).* Student descriptions of the frequency instructors evidenced 6 specific teaching behaviors correlated .48 or higher with student achievement as measured by student self-ratings of their progress on gaining factual knowledge (table 3). The 6 effective teaching behaviors are listed below along with the degree of correlation with student achievement.

a. Provided the students with practice (experience) in recalling factual knowledge (terminology, classifications, methods, trends): .59

b. Pointed out what was important to learn in each class session: .57

c. Gave step-by-step instructions when needed by students: .54

d. Provided relevant information in response to student questions: .51

e. Made positive statements about the subject matter of the course: .50

f. Presented well organized lectures: .49

2. *Learning fundamental principles, concepts, or theories.* Similarly, 13 specific teaching behaviors correlated .48 or higher with student achievement on learning fundamental principles, concepts, or theories (table 3).

a. Provided students with practice (experience) in recalling fundamental principles, concepts, or theories: .62

b. Made positive statements about the subject matter of the course: .56

c. Pointed out what was important to learn in each class session: .54

d. Gave step-by-step instructions when needed by students: .54

e. Displayed concern that students learn: .54

f. Provided the students with practice (experience) in recalling factual knowledge (terminology, classifications, methods, trends): .54

g. Stated the objectives of the course: .53

h. Presented well-organized lectures: .51

i. Provided students with practice (experience) in logical thinking, problem-solving, and decision making: .51

j. Provided relevant information in response to student questions: .50

k. Indicated when a new topic was being introduced: .49

l. Used examples to help make a point: .49

m. Summarized material presented in each class session: .48

3. *Improving logical thinking, problem-solving, and decision-making abilities.* Five specific teaching behaviors proved effective (correlated .48 or higher with student achievement) in improving logical thinking, problem-solving, and decision-making abilities (table 3):

a. Provided students with practice (experience) in logical thinking, problem-solving, and decision-making: .83

b. Provided students with practice (experience) in recalling fundamental principles, concepts, or theories: .64

c. Provided students with practice (experience) in developing skills in organizing ideas and presenting them: .62

d. Provided students with opportunities to be creative (imaginative, inventive, original): .50

e. Provided answers along with objective-type homework assignments: .48

4. *Developing specific psychomotor (manipulative, manual) skills.* Only 3 specific teaching behaviors correlated .48 or higher with student achievement on developing specific psychomotor (manipulative, manual) skills (table 3):

a. Provided students with practice (experience) in developing specific psychomotor (manipulative, manual) skills: .93

b. Provided the students with practice (experience) in recalling factual knowledge (terminology, classifications, methods, trends): .49

c. Used a variety of teaching materials: .48

5. *Developing favorable attitude toward subject matter.* A wide variety of specific teaching behaviors (14) correlated .48 or higher with student achievement in developing a favorable attitude toward the subject matter (table 3):

a. Made positive statements about the subject matter of the course: .69

b. Provided relevant information in response to student questions: .68

c. Displayed concern that students learn: .62

d. Stated the objectives of the course: .61

e. Used a variety of teaching techniques: .60

f. Used examples to help make a point: .60

g. Initiated conversation with students before and after class: .58

h. Spoke with expressiveness and variety in tone of voice: .58

i. Gave step-by-step instructions when needed by students: .53

j. Related course material to real-life situations: .53

k. Pointed out what was important to learn in each session: .52

l. Used a variety of teaching materials: .51

m. Used understandable vocabulary: .50

n. Provided students with practice (experience) in recalling fundamental principles, concepts, or theories: .49

6. *Developing creative (imaginative, inventive, original) capabilities.* The 10 teaching behavior correlates (.48 or higher) of student achievement on developing creative (imaginative, inventive, original) capabilities were:

a. Provided students with opportunities to be creative (imaginative, inventive, original): .86

b. Provided students with practice (experience) in

Table 3. *Correlations between 28 effective teaching behaviors and student achievement on 7 general teaching objectives in 402 undergraduate classes*

Specific teaching behaviors	*Student achievement on general teaching objectives**						
	1	*2*	*3*	*4*	*5*	*6*	*7*
The Instructor:							
1. Pointed out what was important to learn in each class session	**.57**	**.54**	.35	.32	**.52**	.23	.13
2. Gave step-by-step instructions when needed by students	**.54**	**.54**	.34	.47	**.53**	.24	.10
3. Stated the objectives of course	.46	**.53**	.37	.16	**.61**	.39	.27
4. Promoted teacher-student discussion (as opposed to mere response to questions)	.05	.21	.41	.16	.45	**.59**	**.56**
5. Displayed concern that students learn	.45	**.54**	.43	.19	**.62**	.38	.29
6. Encouraged silent students to participate	.07	.21	.44	.24	.35	**.55**	**.53**
7. Initiated conversation with students before and after class	.24	.32	.33	.23	**.58**	**.53**	.41
8. Addressed students by name	.11	.21	.35	.32	.38	**.49**	.47
9. Made positive statements about the subject matter of the course	**.50**	**.56**	.37	.20	**.69**	.38	.23
10. Spoke with expressiveness and variety in tone of voice	.34	.39	.36	.12	**.58**	.39	.29
11. Indicated when a new topic was being introduced	.44	**.49**	.24	.02	.47	.08	.05
12. Used a variety of teaching techniques	.39	.42	.36	.38	**.60**	**.49**	.31
13. Used a variety of teaching materials	.41	.35	.21	**.48**	**.51**	.40	.18
14. Used understandable vocabulary	.24	.31	.19	.12	**.50**	.25	.15
15. Related course material to real-life situations	.26	.40	.33	.06	**.53**	.33	.17
16. Used examples to help make a point	.33	**.49**	.38	-.07	**.60**	.30	.20
17. Summarized material presented in each class session	.38	**.48**	.39	.15	.47	.33	.29
18. Presented well-organized lectures	**.49**	**.51**	.30	.08	.47	.14	.10
19. Provided the students with practice (experience) in recalling factual knowledge (terminology, classifications, methods, trends)	**.59**	**.54**	.47	**.49**	.44	.33	.21
20. Provided students with practice (experience) in recalling fundamental principles, concepts, or theories	.45	**.62**	**.64**	.45	**.49**	**.52**	.40
21. Provided students with practice (experience) in logical thinking, problem-solving, and decision-making	.26	**.51**	**.83**	.39	.37	**.61**	**.54**
22. Provided students with practice (experience) in developing specific psychomotor (manipulative, manual) skills	.31	.29	.29	**.93**	.27	.39	.22
23. Provided students with practice (experience) in developing skills in organizing ideas and presenting them	-.01	.22	**.62**	.42	.32	**.78**	**.85**
24. Provided students with opportunities to be creative (imaginative, inventive, original)	-.01	.15	**.50**	.33	.36	**.86**	**.75**
25. Praised students during class	.11	.26	.41	.30	.43	**.57**	**.50**
26. Provided answers along with objective-type homework assignments	.17	.28	**.48**	.14	.04	.16	.16
27. Provided relevant information in response to student questions	**.51**	**.50**	.31	.15	**.68**	.29	.16
28. Made written comments on our papers	-.04	.13	.33	.22	.09	.37	**.51**
Total effective teaching behaviors for each general teaching objective	6	13	5	3	14	10	7

* *Key to general objectives:*

1. Gaining factual knowledge (terminology, classifications, methods, trends).

2. Learning fundamental principles, concepts, or theories.

3. Improving logical thinking, problem-solving, and decision-making abilities.

4. Developing specific psychomotor (manipulative, manual) skills.

5. Developing a favorable attitude toward the subject matter.

6. Developing creative (imaginative, inventive, original) capabilities.

7. Developing skills in organizing ideas and presenting them in written and oral forms.

developing skills in organizing ideas and presenting them: .78

c. Provided students with practice (experience) in logical thinking, problem-solving, and decision-making: .61

d. Promoted teacher-student discussion (as opposed to mere response to questions): .59

e. Praised students during class: .57

f. Encouraged silent students to participate: .55

g. Initiated conversation with students before and after class: .53

h. Provided students with practice (experience) in recalling fundamental principles, concepts, or theories: .52

i. Addressed students by name: .49

j. Used a variety of teaching techniques: .49

7. *Developing skills in organizing ideas and presenting them in written and oral forms.* Seven teaching behaviors appeared to be effective (correlated .48 or higher) for developing skills in organizing ideas and presenting them in written and oral form (table 3):

a. Provided students with practice (experience) in developing skills in organizing ideas and presenting them: .85

b. Provided students with opportunities to be creative (imaginative, inventive, original): .75

c. Promoted teacher-student discussion (as opposed to mere response to questions): .56

d. Provided students with practice (experience) in logical thinking, problem-solving, and decision-making: .54

e. Encouraged silent students to participate: .53

f. Made written comments on our papers: .51

g. Praised students during class: .50

8. *Summary.* Student descriptions of the frequency instructors evidenced 28 specific teaching behaviors correlated .48 or higher with student achievement as measured by student self-ratings of their progress on 1 or more of 7 general teaching objectives (table 3).

Seventeen additional teaching behaviors did not correlate as high as .48 with student achievement on any of the 7 general teaching objectives (table 4).

C. Reliability

Adjusted inter-rater reliabilities of student self-ratings of their progress on the 7 general teaching objectives were computed for each of five different class sizes (table 5). Odd-numbered students and even-numbered students tended to make similar judgments concerning their progress in a given course compared to other courses taken at the same college or university. The reliability of such judgments improved as class size became larger. The means of the adjusted correlation coefficients for the 7 general teaching objectives: increased from r = .73 when 11 raters were involved to r = .81 for 15 raters, and to r = .86 for 22 raters; remained essentially constant at r = .85 for 30 raters; and increased to r = .95 for 73 raters.

Adjusted inter-rater reliabilities of student ratings of the frequency their instructors evidenced 28 specific teach-

Table 4. *Correlations between 17 ineffective teaching behaviors and student achievement on 7 general teaching objectives in 402 undergraduate classes*

Specific teaching behaviors	*Student achievement on general teaching objectives**						
	1	*2*	*3*	*4*	*5*	*6*	*7*
The Instructor:							
1. Described at the beginning of each class session what she or he planned to do	.40	.37	.15	.31	.45	.18	.11
2. Discouraged students from expressing themselves freely and openly	-.15	-.39	-.19	.04	-.40	-.21	-.20
3. Presented course material at too slow a pace	-.37	-.31	-.16	-.09	-.23	.00	.02
4. Brought needed materials to class	.32	.34	.21	.27	.41	.23	.15
5. Met with students to give individual assistance with course work	.17	.30	.42	.22	.33	.42	.40
6. Presented course material at too fast a pace	.08	-.02	-.06	-.08	-.34	-.28	-.23
7. Moved around the classroom	.17	.09	.09	.43	.24	.23	.12
8. Used gestures while teaching	.17	.24	.24	.17	.42	.33	.22
9. Used visual aids to complement oral presentations	.38	.22	-.02	.29	.36	.10	-.07
10. Required more work per credit hour than other instructors	.14	.08	.19	.22	-.21	.03	.18
11. Reviewed the material to be included in examinations	.32	.35	.25	-.01	.18	.06	.02
12. Gave exams with balanced coverage of major topics	.44	.42	.10	-.03	.23	-.14	-.20
13. Gave ungraded tests on new material before teaching that material	.06	.05	.16	.04	.06	.20	.15
14. Was harshly critical of student responses	-.10	-.15	-.12	-.03	-.31	-.14	-.11
15. Stated the question and the correct answer when reviewing tests	.35	.38	.19	-.04	.16	-.08	-.11
16. Reminded students of upcoming quizzes/exams	.33	.35	.06	-.08	.10	-.18	-.17
17. Threatened to make us rewrite inadequate work	-.18	-.13	.07	.11	-.17	.18	.25

* *Key to general objectives:*

1. Gaining factual knowledge (terminology, classifications, trends).

2. Learning fundamental principles, concepts, or theories.

3. Improving logical thinking, problem-solving, and decision-making abilities.

4. Developing specific psychomotor (manipulative, manual) skills.

5. Developing a favorable attitude toward the subject matter.

6. Developing creative (imaginative, inventive, original) capabilities.

7. Developing skills in organizing ideas and presenting them in written and oral forms.

Table 5. *Reliabilities of student progress ratings by size of class*

Progress rating on:	*Average size of class*				
	11	*15*	*23*	*31*	*76*
1. Gaining factual knowledge (terminology, classifications, methods, trends)	.79	.80	.90	.76	.94
2. Learning fundamental principles, concepts, or theories	.69	.75	.81	.77	.91
3. Improving logical thinking, problem-solving, and decision-making abilities	.63	.76	.72	.88	.93
4. Developing specific psychomotor (manipulative, manual) skills	.86	.88	.94	.91	.96
5. Developing a favorable attitude toward the subject matter	.71	.7[illegible]	.87	.82	.91
6. Developing creative (manipulative, inventive, original) capabilities	.66	.83	.81	.88	.89
7. Developing skills in organizing ideas and presenting them in written and oral forms	.66	.85	.85	.87	.92
Mean reliability coefficient	.73	.81	.86	.85	.93

ing behaviors were also computed for each of five different class sizes (table 6). Again, odd-number and even-numbered students tended to make similar judgments. The reliability of such judgments improved as class size became larger. The means of the adjusted correlation coefficients for the 28 teaching behaviors increased from r = .72 when 11 raters were involved, to r = .80 for 15 raters, to r = .87 for 23 raters, to r = .88 for 31 raters, and r = .93 for 76 raters.

D. Validity of student ratings of progress as a criterion of achievement

When the indirect test of validity used by Hoyt (1969) was applied to the data derived from 402 classes in this study, the seven critical correlations (boldface in table 7) were all significantly greater than zero ($P < .01$) and ranged from .13 to .63 with a mean of .34. The 42 "irrelevant"

Table 7. *Intercorrelations of average student progress ratings and instructors' ratings of importance of 7 general teaching objectives (N = 402 classes)*

Teaching objectives		*Student progress ratings*						
		1	*2*	*3*	*4*	*5*	*6*	*7*
Instructors' ratings of importance	*1*	**.29**	.07	-.05	.21	.08	-.06	-.15
	2	.13	**.13**	.03	.20	.03	.06	-.02
	3	.04	.08	**.28**	.05	.03	.19	.23
	4	.11	-.05	.13	**.63**	.04	.20	.11
	5	-.03	-.02	.01	.12	**.13**	.15	.05
	6	-.21	-.04	.15	.15	.12	**.33**	.32
	7	-.21	-.03	.20	-.03	.03	.25	**.45**

* *Key to general teaching objectives:*
1 = Gaining factual knowledge (terminology, classifications, methods, trends).
2 = Learning fundamental principles, concepts, or theories.
3 = Improving logical thinking, problem-solving, and decision-making abilities.
4 = Developing specific psychomotor (manipulative, manual) skills.
5 = Developing a favorable attitude toward the subject matter.
6 = Developing creative (imaginative, inventive, original) capabilities.
7 = Developing skills in organizing ideas and presenting them in written and oral forms.

Table 6. *Reliabilities of effective teaching behaviors by size of class*

Student ratings of the frequency instructor:	*Average size of class*				
	11	*15*	*23*	*31*	*76*
1. Pointed out what was important to learn in each class session	.82	.70	.87	.77	.95
2. Gave step-by-step instructions when needed by students	.81	.73	.86	.81	.92
3. Stated the objectives of the course	.70	.77	.84	.83	.92
4. Promoted teacher-student discussion (as opposed to mere response to questions)	.69	.78	.89	.90	.93
5. Displayed concern that students learn	.70	.73	.81	.83	.89
6. Encouraged silent students to participate	.67	.88	.91	.92	.94
7. Initiated conversation with students before and after class	.68	.82	.92	.91	.92
8. Addressed students by name	.89	.88	.96	.95	.99
9. Made positive statements about the subject matter of the course	.66	.66	.81	.80	.90
10. Spoke with expressiveness and variety in tone of voice	.70	.88	.91	.92	.96
11. Indicated when a new topic was being introduced	.47	.53	.83	.81	.89
12. Used a variety of teaching techniques	.54	.84	.82	.88	.92
13. Used a variety of teaching materials	.75	.87	.83	.91	.92
14. Used understandable vocabulary	.44	.57	.63	.88	.92
15. Related course material to real-life situations	.72	.79	.91	.92	.95
16. Used examples to help make a point	.63	.84	.80	.80	.91
17. Summarized material presented in each class session	.58	.70	.90	.91	.89
18. Presented well-organized lectures	.84	.87	.91	.96	.96
19. Provided the students with practice (experience) in recalling factual knowledge (terminology, classifications, methods, trends)	.74	.75	.84	.81	.89
20. Provided students with practice (experience) in recalling fundamental principles, concepts, or theories	.82	.75	.91	.89	.94
21. Provided students with practice (experience) in logical thinking, problem-solving, and decision-making	.68	.77	.80	.86	.91
22. Provided students with practice (experience) in developing specific psychomotor (manipulative, manual) skills	.66	.79	.80	.84	.88
23. Provided students with practice (experience) in developing skills in organizing ideas and presenting them	.73	.82	.76	.88	.95
24. Provided students with opportunities to be creative (imaginative, inventive, original)	.89	.89	.94	.94	.95
25. Praised students during class	.64	.85	.87	.90	.86
26. Provided answers along with objective-type homework assignments	.77	.84	.90	.91	.95
27. Provided relevant information in response to student questions	.63	.82	.81	.79	.91
28. Made written comments on our papers	.78	.89	.92	.91	.96
Mean reliability coefficient	.72	.80	.87	.88	.93

correlations (student progress on one general teaching objective *versus* importance on another) averaged .06.

E. Norm tables

One of the major purposes of this study was to develop a system for providing feedback to a college instructor that would enable improvement of her or his teaching. To achieve this end two discrete sets of norms were constructed using data from those classes in which the instructors rated a given general teaching objective as important, very important, or absolutely essential. One set of norms deals with the distribution of student ratings of progress on each of the general teaching objectives (table 8). With a knowledge of (1) the general teaching objectives she or he considered important for a given course, and (2) the class mean student progress rating on each, this set of norms allows an individual instructor to determine on which important general teaching objectives he or she was rated *high* and which *low*, that is, in comparison with the norm group.

The second set of norms deals with the distribution of student ratings of certain effective teaching behaviors correlated .48 or higher with progress on each of the 7 general teaching objectives (table 9). Given a knowledge of her or his important general teaching objectives on which student progress was rated low, the instructor can identify teaching strengths and weaknesses and improve accordingly.

Table 8. *Norms for student ratings of progress on 7 general teaching objectives; Norm group: Classes in which the instructors rated a given objective as important, very important, or absolutely essential*

Percentile	*Item 29 Gaining factual knowledge (N = 353)*	*Item 30 Learning fundamental principles (N = 373)*	*Item 31 Improving logical thinking (N = 352)*	*Item 32 Developing psychomotor skills (N = 139)*	*Item 33 Developing favorable attitude (N = 352)*	*Item 34 Developing creative capacities (N = 259)*	*Item 35 Organizing and presenting ideas (N = 278)*
99	4.7	4.6	4.5	4.8	4.8	4.7	4.8
95	4.5	4.3	4.1	4.6	4.6	4.3	4.5
90	4.3	4.1	3.8	4.4	4.4	4.0	4.2
80	4.1	4.0	3.5	4.2	4.2	3.7	3.8
70	4.0	3.8	3.3	4.0	4.1	3.4	3.4
60	3.8	3.7	3.2	3.8	3.9	3.2	3.3
50	3.7	3.6	3.0	3.7	3.8	3.0	3.1
40	3.6	3.4	2.9	3.5	3.6	2.9	3.0
30	3.5	3.3	2.7	3.2	3.4	2.7	2.7
20	3.3	3.2	2.6	2.6	3.3	2.5	2.5
10	3.0	3.0	2.4	2.2	3.0	2.4	2.2
5	2.8	2.7	2.1	2.0	2.8	2.1	2.1
1	2.4	2.3	1.9	1.6	2.1	1.8	1.7

Table 9. *Norms for student ratings of 28 effective teaching behaviors correlated .48 or higher with progress on each of 7 general teaching objectives; Norm group: classes in which the instructor rated a given objective as important, very important, or absolutely essential.*

Item 29. Gaining factual knowledge (terminology, classifications, methods, trends) (N = 353)

Percentile	*Effective teaching behavior items related to this general teaching objective*					
	1	*2*	*9*	*18*	*19*	*27*
99	4.6	4.8	4.8	4.8	4.4	4.8
95	4.3	4.6	4.6	4.5	3.9	4.6
90	4.2	4.4	4.5	4.4	3.7	4.5
80	3.9	4.2	4.3	4.1	3.4	4.4
70	3.8	4.1	4.2	3.9	3.2	4.3
60	3.6	3.9	4.1	3.7	3.1	4.1
50	3.5	3.8	4.0	3.5	2.9	4.0
40	3.3	3.7	3.9	3.2	2.8	3.9
30	3.1	3.5	3.8	2.9	2.7	3.8
20	3.0	3.3	3.7	2.7	2.5	3.7
10	2.7	3.0	3.5	2.2	2.2	3.5
5	2.4	2.8	3.3	1.9	2.0	3.2
1	2.0	2.4	2.9	1.5	1.7	2.9

Item 30. Learning fundamental principles, concepts, or theories (N = 373)

Percentile	*Effective teaching behavior items related to this general teaching objective*												
	1	*2*	*3*	*5*	*9*	*11*	*16*	*17*	*18*	*19*	*20*	*21*	*27*
99	4.6	4.8	4.7	4.8	4.8	4.9	4.8	4.5	4.8	4.4	4.8	4.6	4.8
95	4.3	4.6	4.5	4.6	4.6	4.7	4.7	4.1	4.6	4.0	4.6	4.2	4.6
90	4.1	4.4	4.4	4.4	4.5	4.7	4.6	3.9	4.4	3.7	4.5	4.0	4.5
80	3.9	4.2	4.2	4.2	4.3	4.6	4.5	3.7	4.2	3.4	4.3	3.7	4.4
70	3.8	4.0	4.1	4.0	4.2	4.5	4.4	3.5	4.0	3.3	4.1	3.5	4.3
60	3.6	3.9	4.0	3.9	4.1	4.4	4.3	3.3	3.8	3.1	4.0	3.4	4.2
50	3.5	3.8	3.8	3.8	4.0	4.3	4.2	3.1	3.5	2.9	3.8	3.2	4.0
40	3.3	3.6	3.7	3.7	3.9	4.2	4.0	3.0	3.2	2.8	3.6	3.1	3.9
30	3.1	3.5	3.6	3.5	3.8	4.0	3.9	2.8	2.9	2.7	3.4	2.9	3.8
20	2.9	3.2	3.4	3.3	3.7	3.9	3.8	2.6	2.6	2.5	3.2	2.7	3.7
10	2.7	3.0	3.1	3.0	3.5	3.7	3.5	2.4	2.2	2.2	2.9	2.4	3.5
5	2.4	2.8	2.8	2.8	3.3	3.5	3.3	2.2	1.9	2.0	2.6	2.3	3.2
1	1.8	2.4	2.4	2.4	2.9	3.1	3.0	1.8	1.5	1.7	2.0	1.8	2.8

Table 9. *Continued*

Item 31. Improving logical thinking, problem-solving, and decision-making abilities (N = 352)

Percentile	*Effective teaching behavior items related to this general teaching objective*				
	20	*21*	*23*	*24*	*26*
99	4.8	4.6	4.7	4.6	4.3
95	4.6	4.1	4.3	4.4	3.7
90	4.5	3.9	4.1	4.2	3.2
80	4.3	3.7	3.7	3.8	2.8
70	4.1	3.5	3.6	3.4	2.5
60	4.0	3.4	3.4	3.0	2.2
50	3.8	3.3	3.2	2.7	2.0
40	3.6	3.1	3.1	2.4	1.8
30	3.4	2.9	2.9	2.1	1.6
20	3.2	2.7	2.7	1.9	1.4
10	2.9	2.4	2.3	1.5	1.2
5	2.6	2.3	2.1	1.4	1.1
1	2.0	1.6	1.7	1.0	0.9

Item 32. Developing specific psychomotor (manipulative, manual) skills (N = 139)

Percentile	*Effective teaching behavior items related to this general teaching objective*		
	13	*19*	*22*
99	4.8	4.4	4.5
95	4.5	4.1	4.3
90	4.2	3.7	4.1
80	3.9	3.5	3.8
70	3.8	3.2	3.7
60	3.7	3.1	3.5
50	3.5	2.9	3.4
40	3.4	2.8	3.3
30	3.2	2.7	3.2
20	2.9	2.5	3.0
10	2.7	2.2	2.7
5	2.4	2.1	2.5
1	1.9	1.7	2.1

Item 33. Developing a favorable attitude toward the subject matter (N = 352)

Percentile	*Effective teaching behavior items related to this general teaching objective*													
	1	*2*	*3*	*5*	*7*	*9*	*10*	*12*	*13*	*14*	*15*	*16*	*20*	*27*
99	4.6	4.8	4.7	4.8	4.6	4.8	4.7	4.4	4.7	4.9	4.8	4.8	4.8	4.8
95	4.3	4.6	4.5	4.6	4.5	4.6	4.6	4.1	4.3	4.8	4.7	4.7	4.6	4.6
90	4.2	4.4	4.4	4.4	4.3	4.5	4.5	3.9	4.1	4.7	4.7	4.6	4.5	4.5
80	4.0	4.2	4.3	4.2	4.1	4.3	4.3	3.6	3.8	4.6	4.6	4.5	4.3	4.4
70	3.8	4.0	4.1	4.0	3.9	4.2	4.2	3.4	3.7	4.5	4.5	4.4	4.1	4.3
60	3.7	3.9	4.0	3.9	3.7	4.1	4.0	3.3	3.5	4.5	4.3	4.3	4.0	4.2
50	3.5	3.8	3.8	3.8	3.5	4.0	3.8	3.1	3.3	4.4	4.3	4.2	3.8	4.0
40	3.3	3.6	3.7	3.7	3.3	3.9	3.6	2.9	3.1	4.3	4.1	4.0	3.6	3.9
30	3.1	3.5	3.6	3.5	3.1	3.8	3.4	2.7	2.9	4.2	3.9	3.9	3.4	3.8
20	3.0	3.3	3.4	3.3	2.9	3.7	3.1	2.5	2.7	4.1	3.7	3.8	3.2	3.7
10	2.7	3.0	3.1	3.0	2.6	3.5	2.8	2.2	2.3	3.9	3.5	3.5	2.9	3.4
5	2.4	2.8	2.8	2.8	2.4	3.3	2.5	2.0	2.0	3.7	3.1	3.3	2.6	3.2
1	2.2	2.4	2.3	2.5	2.1	2.9	1.8	1.8	1.6	3.0	2.5	3.0	2.1	2.8

Item 34. Developing creative (imaginative, inventive, original) capabilities (N = 259)

Percentile	*Effective teaching behavior items related to this general teaching objective*									
	4	*6*	*7*	*8*	*12*	*20*	*21*	*23*	*24*	*25*
99	4.8	4.6	4.7	4.9	4.5	4.7	4.4	4.6	4.6	4.2
95	4.6	3.9	4.5	4.9	4.1	4.6	4.1	4.3	4.4	3.7
90	4.4	3.7	4.3	4.8	3.9	4.4	3.9	4.1	4.2	3.5
80	4.1	3.2	4.1	4.7	3.6	4.3	3.7	3.8	3.8	3.0
70	3.9	2.7	4.0	4.5	3.5	4.1	3.5	3.7	3.5	2.8
60	3.7	2.4	3.8	4.3	3.3	3.9	3.4	3.5	3.1	2.6
50	3.5	2.3	3.6	3.8	3.1	3.7	3.3	3.3	2.8	2.4
40	3.3	2.1	3.4	3.5	2.9	3.6	3.1	3.1	2.6	2.2
30	3.1	1.8	3.2	3.1	2.7	3.4	2.9	2.9	2.3	2.1
20	2.8	1.7	2.9	2.3	2.5	3.2	2.7	2.7	2.0	1.9
10	2.5	1.4	2.6	1.8	2.3	2.9	2.4	2.4	1.6	1.7
5	2.3	1.3	2.4	1.5	2.1	2.6	2.3	2.2	1.4	1.5
1	1.8	1.1	2.1	1.1	1.8	2.0	1.8	1.7	1.2	1.3

Item 35. Developing skills in organizing ideas and presenting them in written and oral forms (N = 278)

Percentile	*Effective teaching behavior items related to this general teaching objective*						
	4	*6*	*21*	*23*	*24*	*25*	*28*
99	4.8	4.3	4.4	4.8	4.7	4.2	4.8
95	4.6	4.0	4.1	4.4	4.4	3.8	4.6
90	4.4	3.7	4.0	4.1	4.2	3.4	4.4
80	4.1	3.2	3.7	3.8	3.8	3.0	4.0
70	3.9	2.7	3.6	3.6	3.4	2.8	3.6
60	3.7	2.5	3.4	3.5	3.0	2.6	3.4
50	3.5	2.3	3.3	3.3	2.7	2.4	3.0
40	3.4	2.1	3.1	3.1	2.5	2.3	2.8
30	3.1	1.9	2.9	2.9	2.2	2.1	2.5
20	2.9	1.7	2.7	2.6	2.0	1.9	2.2
10	2.5	1.4	2.4	2.3	1.6	1.7	1.9
5	2.3	1.3	2.2	2.2	1.4	1.5	1.6
1	1.8	1.1	1.7	1.9	1.2	1.3	1.1

F. Resulting products

1. *Instructor form.* This form provides for the collection of three types of information from the instructor (fig. 1).

a. Identification information including: instructor's name, sex, rank, college, department, office room number and building, city, state, zip code, course number, meeting schedule (hour and days) of the class section, the number of students enrolled in the class section, and type of section (lecture, laboratory, or recitation/discussion).

b. The instructor's rating of the importance of each of the 7 general teaching objectives for *this* section of the class using the code: not important, of no more than minor importance, important, very important, and absolutely essential.

c. As many as five additional questions, not included on the *Student Form*, amenable to machine scoring with from one to five response choices each, and the marking codes to be employed for each by the students.

2. *Student form.* The introduction informs the student of the purpose of the form, tells how to record responses, and provides space for writing in the name of the instructor, course number, meeting hour and meeting days (fig. 2).

Part I provides an opportunity for the student to describe the teaching behavior of the instructor on 28 items using the code: hardly ever, occasionally, sometimes, frequently, and almost always. Part II asks the student to rate progress made in this course in comparison with that made in other courses taken at this college or university on each of the 7 general teaching objectives using the code: lowest 10 percent, next 20 percent, middle 40 percent, next 20 percent, and upper 10 percent. Part III instructs the student to use the spaces provided to answer up to five additional questions supplied by the instructor. Part IV asks the student to record his or her sex, whether the course is required or elective, and class – freshman, sophomore, junior, senior, graduate, or other. Part V invites the student to write any additional comments he or she may care to make on the back of the form.

Provision is made for the student to record all responses directly on the single form. Student responses are tabulated directly from this sheet by the optical scanner.

3. *Instructor's printout.* The top of the printout displays the identification information previously supplied on the *Instructor Form* (fig. 3). The second portion of the printout describes the purpose of the system and provides information concerning the composition of the norm group. The body of the printout provides the instructor with (a) detailed data concerning the students' ratings of their progress on the general teaching objectives judged by the instructor to be important, very important, or absolutely important for this class section; (b) detailed data concerning the students' ratings of the instructor's teaching behaviors; (c) detailed data concerning the students' responses to voluntary questions supplied by the instructor; and (d) a series of instructions for use by the instructor in formulating his or her personal prescription for improvement.

4. *Computer Programs.* The computer programs for the optical scanner and the electronic computer are available at nominal cost. Institutions interested in using the system should contact Dr. Herbert L. Everett, Director of Resident Instruction, New York State College of Agriculture and Life Sciences, Cornell University, Ithaca, New York, 14853.

Figure 1.

INSTRUCTOR FORM

THE CORNELL DIAGNOSTIC OBSERVATION AND REPORTING SYSTEM FOR STUDENT DESCRIPTION OF COLLEGE TEACHING

Directions: Please fill out a separate copy of this form for each lecture, laboratory, discussion, and recitation section for which your students will be completing STUDENT FORM.

INSTRUCTOR'S NAME (Print): _____ SEX: _____
(First) (M.I.) (Last)

RANK: _____ Professor; _____ Assoc. Prof.; _____ Asst. Prof.; _____ Teach. Asst.; _____ Other

COLLEGE: _____ DEPARTMENT: _____

OFFICE ROOM NUMBER AND BUILDING: _____

CITY: _____ STATE: _____ ZIP: _____

COURSE NUMBER: _____ MEETING SCHEDULE OF THIS SECTION OF COURSE (e.g., 9:00 MWF):

Hour: _____ Days: _____

NUMBER OF STUDENTS ENROLLED IN THIS SECTION: _____

TYPE OF SECTION (Check one): ____ Lecture; ____ Laboratory; ____ Recitation/Discussion

Read carefully the following seven general teaching objectives for undergraduate courses. Rate *each* in terms of its importance for *this* section of your class, using the code which follows:

1. Not important
2. Of no more than minor importance
3. Important
4. Very important
5. Absolutely essential

Circle one:	*General Teaching Objectives*
1 2 3 4 5	1. Gaining factual knowledge (terminology, classifications, methods, trends).
1 2 3 4 5	2. Learning fundamental principles, concepts, or theories.
1 2 3 4 5	3. Improving logical thinking, problem-solving, and decision-making abilities.
1 2 3 4 5	4. Developing specific psychomotor (manipulative, manual) skills.
1 2 3 4 5	5. Developing a favorable attitude toward the subject matter.
1 2 3 4 5	6. Developing creative (imaginative, inventive, original) capabilities.
1 2 3 4 5	7. Developing skills in organizing ideas and presenting them in written and oral forms.

For Office Use Only

CODE NUMBER [ ][ ][ ] College [ ][ ][ ] Instructor [ ] Section

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PLEASE TURN OVER

Figure 1. Continued

PART III of the *Student Form* used with this *Instructor Form* provides space for your students to answer up to five additional questions about which you wish to solicit their opinions. If you care to add additional questions, note that they must be amenable to machine scoring with from one to five responses each. On the day the *Student Form* is to be administered, arrange to have your special questions and marking codes distributed to each student. For each question, be sure to include the marking code in normal sequence, that is, proceeding from left to right in ascending order of value.

Examples:

Item	Code				
— The instructor was available outside of class to provide individual assistance to students.	hardly ever	occa-sion-ally	some-times	fre-quently	almost always
— Taken as a whole, the course was	poor	fair	aver-age	good	excel-lent

Record below the special questions and marking codes you wish to use. These will be reproduced on your individual computer printout with a summary of your students' responses.

Item	Code				
Question 36:					
Question 37:					
Question 38:					
Question 39:					
Question 40:					

Figure 2.

STUDENT FORM
THE CORNELL DIAGNOSTIC OBSERVATION AND REPORTING SYSTEM FOR STUDENT DESCRIPTION OF COLLEGE TEACHING

DO NOT WRITE IN THIS SPACE

THE PURPOSE OF THIS FORM IS TO ALLOW YOU TO PROVIDE INFORMATION TO YOUR INSTRUCTOR WHICH WILL ASSIST HIM IN IMPROVING HIS TEACHING.
RECORD YOUR RESPONSE BY MARKING THE APPROPRIATE SPACE WITH A SOFT LEAD PENCIL. DO NOT WRITE OR MARK ANY WHERE ELSE. BE SURE TO ERASE ERRORS COMPLETELY.

INSTRUCTOR _____ *COURSE NO.* _____ *MEETING: HOUR* _____ *DAYS* _____

PART I

DESCRIBE THE TEACHING BEHAVIOR OF YOUR INSTRUCTOR BY MARKING THE BOX IN THE APPROPRIATE COLUMN TO THE RIGHT OF EACH ITEM.

THE INSTRUCTOR:

	HARDLY EVER	OCCASIONALLY	SOMETIMES	FREQUENTLY	ALMOST ALWAYS
1. POINTED OUT WHAT WAS IMPORTANT TO LEARN IN EACH CLASS SESSION					
2. GAVE STEP-BY-STEP INSTRUCTIONS WHEN NEEDED BY STUDENTS					
3. STATED THE OBJECTIVES OF THE COURSE					
4. PROMOTED TEACHER - STUDENT DISCUSSION (AS OPPOSED TO MERE RESPONSE TO QUESTIONS)					
5. DISPLAYED CONCERN THAT STUDENTS LEARN					
6. ENCOURAGED SILENT STUDENTS TO PARTICIPATE					
7. INITATED CONVERSATION WITH STUDENTS BEFORE AND AFTER CLASS					
8. ADDRESSED STUDENTS BY NAME					
9. MADE POSITIVE STATEMENTS ABOUT THE SUBJECT MATTER OF THE COURSE					
10. SPOKE WITH EXPRESSIVENESS AND VARIETY IN TONE OF VOICE					
11. INDICATED WHEN A NEW TOPIC WAS BEING INTRODUCED					
12. USED A VARIETY OF TEACHING TECHNIQUES					
13. USED A VARIETY OF TEACHING MATERIALS					
14. USED UNDERSTANDABLE VOCABULARY					
15. RELATED COURSE MATERIALS TO REAL-LIFE SITUATIONS					
16. USED EXAMPLES TO HELP MAKE A POINT					
17. SUMMARIZED MATERIAL PRESENTED IN EACH CLASS SESSION					
18. PRESENTED WELL-ORGANIZED LECTURES					
19. PRAISED STUDENTS DURING CLASS					
20. PROVIDED ANSWERS ALONG WITH OBJECTIVE-TYPE HOMEWORK ASSIGNMENTS					
21. PROVIDED RELEVANT INFORMATION IN RESPONSE TO STUDENT QUESTIONS					
22. MADE WRITTEN COMMENTS ON STUDENT PAPERS					

PART I (CONTINUED)

THE INSTRUCTOR PROVIDED STUDENTS WITH:

	HARDLY EVER	OCCASIONALLY	SOMETIMES	FREQUENTLY	ALMOST ALWAYS
23. PRACTICE (EXPERIENCE) IN RECALLING FACTUAL KNOWLEDGE (TERMINOLOGY, CLASSIFICATIONS, METHODS, TRENDS)					
24. PRACTICE (EXPERIENCE) IN RECALLING FUNDAMENTAL PRINCIPLES, CONCEPTS, OR THEORIES					
25. PRACTICE (EXPERIENCE) IN LOGICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING					
26. PRACTICE (EXPERIENCE) IN DEVELOPING SPECIFIC PSYCHOMOTOR (MANIPULATIVE, MANUAL) SKILLS					
27. PRACTICE (EXPERIENCE) IN DEVELOPING SKILLS IN ORGANIZING IDEAS AND PRESENTING THEM					
28. OPPORTUNITIES TO BE CREATIVE (IMAGINATIVE, INVENTIVE, ORIGINAL)					

PART II

RATE THE PROGRESS YOU HAVE MADE IN THIS COURSE IN COMPARISON WITH THAT MADE IN OTHER COURSES YOU HAVE TAKEN AT THIS COLLEGE OR UNIVERSITY BY MARKING THE BOX IN THE APPROPRIATE COLUMN TO THE RIGHT OF EACH ITEM.

RATE YOUR PROGRESS IN:

	LOWEST 10%	NEXT 20%	MIDDLE 40%	NEXT 20%	UPPER 10%
29. GAINING FACTUAL KNOWLEDGE (TERMINOLOGY, CLASSIFICATIONS, METHODS, TRENDS)					
30. LEARNING FUNDAMENTAL PRINCIPLES, CONCEPTS, OR THEORIES					
31. IMPROVING LOGICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING ABILITIES					
32. DEVELOPING SPECIFIC PSYCHOMOTOR (MANIPULATIVE, MANUAL) SKILLS					
33. DEVELOPING A FAVORABLE ATTITUDE TOWARD THE SUBJECT MATTER					
34. DEVELOPING CREATIVE (IMAGINATIVE, INVENTIVE, ORIGINAL) SKILLS					
35. DEVELOPING SKILLS IN ORGANIZING IDEAS AND PRESENTING THEM IN WRITTEN AND ORAL FORMS					

PART III

USE THE COLUMNS AT THE RIGHT FOR ANY ADDITIONAL QUESTIONS SUPPLIED BY YOUR INSTRUCTOR

	1	2	3	4	5
36.					
37.					
38.					
39.					
40.					

PART IV

PLEASE COMPLETE

41. MALE FEMALE

42. REQUIRED COURSE ELECTIVE COURSE

43. FRESHMAN SOPH. JUNIOR SENIOR GRAD. OTHER

PLEASE DO NOT FOLD OR TEAR

PART V

GENERAL COMMENTS

USE THE BACK OF THIS FORM FOR ANY ADDITIONAL REMARKS YOU CARE TO MAKE FOR YOUR INSTRUCTOR TO READ

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PS 7/65 1 CBF (6441)

COOLEY BUSINESS FORMS, INC.

Figure 3.
INSTRUCTOR'S PRINTOUT

THE CORNELL DIAGNOSTIC OBSERVATION AND REPORTING SYSTEM FOR
STUDENT DESCRIPTION OF COLLEGE TEACHING

INSTRUCTOR'S NAME: JOHN K. SMITH

RANK: PROFESSOR SEX: MALE

COLLEGE: NYS COLLEGE OF AGRI & LIFE SCI.

DEPARTMENT: EDUCATION

OFFICE ROOM NUMBER AND BUILDING: 202 STONE HALL

CITY: ITHACA STATE: NEW YORK ZIP: 14853

COURSE NUMBER: 331

MEETING SCHEDULE OF THIS SECTION OF COURSE:

HOUR: 1:25 DAYS: M W

NUMBER OF STUDENTS ENROLLED IN THIS SECTION: 69

TYPE OF SECTION: X LECTURE: LABORATORY: RECITATION/DISCUSSION

PURPOSE

THE PURPOSE OF THIS DIAGNOSTIC OBSERVATION AND REPORTING SYSTEM IS TO HELP YOU IMPROVE THE EFFECTIVENESS OF YOUR TEACHING TO THE END THAT STUDENT ACHIEVEMENT ON OBJECTIVES WHICH YOU CONSIDER IMPORTANT FOR THIS CLASS SESSION WILL BE ENHANCED. INSTRUCTIONS ARE PROVIDED BELOW THAT WILL ALLOW YOU (1) TO COMPARE THE EFFECTIVENESS OF YOUR TEACHING WITH THAT OF OTHER INSTRUCTORS WITH THE SAME OBJECTIVES, (2) TO IDENTIFY SOME STRENGTHS AND WEAKNESSES OF YOUR TEACHING BEHAVIOR, AND (3) TO FORMULATE YOUR PERSONAL PRESCRIPTION FOR IMPROVEMENT.

THE NORMS USED IN THIS PRINTOUT ARE BASED ON DATA COLLECTED FROM 12,792 STUDENTS IN 402 CLASS SECTIONS AT 10 COLLEGES OF AGRICULTURE IN THE NORTHEAST. ALL OF THE INSTRUCTORS WHO PARTICIPATED DID SO VOLUNTARILY IN RESPONSE TO AN INVITATION ISSUED TO ALL FACULTY MEMBERS TEACHING UNDERGRADUATE COURSES. A COPY OF THE FINAL REPORT OF THE STUDY ALLUDED TO ABOVE MAY BE OBTAINED FROM THE HEAD, EDUCATION DEPARTMENT, NEW YORK STATE COLLEGE OF AGRICULTURE AND LIFE SCIENCES, CORNELL UNIVERSITY, ITHACA, NEW YORK, 14853.

INSTRUCTIONS FOR FORMULATING YOUR PERSONAL PRESCRIPTION FOR IMPROVEMENT

1. LOCATE THE GENERAL TEACHING OBJECTIVES PRECEDED BY AN ASTERISK(*) BELOW. THESE ARE THE OBJECTIVES WHICH YOU PREVIOUSLY RATED EITHER IMPORTANT, VERY IMPORTANT, OR ABSOLUTELY ESSENTIAL FOR THIS CLASS SECTION ON THE INSTRUCTOR FORM.

2. FOR EACH, NOTE THE FREQUENCY DISTRIBUTION AND MEAN SCORE OF THE RATINGS ASSIGNED TO YOU BY YOUR STUDENTS AND ALSO THE CORRESPONDING PERCENTILE RANK.

3. WHEREVER A MEAN SCORE OR A PERCENTILE RANK IS UNACCEPTABLY LOW TO YOU, CIRCLE THAT FIGURE AND ALSO THE NUMBER OF THE GENERAL TEACHING OBJECTIVE ON THE SAME HORIZONTAL LINE.

CODE USED IN DESCRIBING STUDENT'S PROGRESS IN THIS COURSE IN COMPARISON WITH OTHER COURSES TAKEN AT THIS COLLEGE OR UNIVERSITY:

LOWEST 10% = (1)
NEXT 20% = (2)
MIDDLE 40% = (3)
NEXT 20% = (4)
UPPER 10% = (5)

GENERAL TEACHING OBJECTIVE:	N	FREQUENCY DIST. (1)	(2)	(3)	(4)	(5)	MEAN	SD	PER-CENTILE
STUDENT PROGRESS IN:									
*29. GAINING FACTUAL KNOWLEDGE (TERMINOLOGY, CLASSIFICATIONS, METHODS, TRENDS)	59	0	3	7	15	34	4.36	0.89	87
*30. LEARNING FUNDAMENTAL PRINCIPLES, CONCEPTS, OR THEORIES	59	2	5	13	19	20	3.85	1.10	63
*31. IMPROVING LOGICAL THINKING, PROBLEM-SOLVING, AND DECISION-MAKING ABILITIES	59	9	11	17	10	12	3.08	1.34	46
*32. DEVELOPING SPECIFIC PSYCHOMOTOR (MANIPULATIVE, MANUAL) SKILLS	57	24	12	13	3	5	2.18	1.28	6
33. DEVELOPING A FAVORABLE ATTITUDE TOWARD THE SUBJECT MATTER	59	1	2	4	12	40	4.49	0.90	
*34. DEVELOPING CREATIVE (IMAGINATIVE, INVENTIVE, ORIGINAL) CAPABILITIES	58	14	12	15	11	6	2.71	1.31	23
35. DEVELOPING SKILLS IN ORGANIZING IDEAS AND PRESENTING THEM IN WRITTEN AND ORAL FORMS	58	11	15	15	9	8	2.79	1.31	

* A GENERAL TEACHING OBJECTIVE RATED BY THE INSTRUCTOR AS BEING EITHER IMPORTANT, OR VERY IMPORTANT, OR ABSOLUTELY ESSENTIAL FOR THIS CLASS SECTION.

4. LOCATE THE COLUMN HEADINGS BELOW LABELED (29), (30), (31), (32), (33), (34), AND (35).

5. CIRCLE THE SAME NUMBERS IN THE COLUMN HEADINGS (29-35) BELOW AS THOSE OF THE GENERAL TEACHING OBJECTIVES THAT YOU PREVIOUSLY CIRCLED IN INSTRUCTION 3.

6. EXAMINE THE MEAN SCORES AND THE PERCENTILE RANKS APPEARING IN THE COLUMNS HEADED BY THE CIRCLED NUMBERS. WHEREVER A MEAN SCORE OR A PERCENTILE RANK IS UNACCEPTABLY LOW TO YOU, CIRCLE THAT FIGURE AND ALSO THE NUMBER OF THE EFFECTIVE TEACHING BEHAVIOR ITEM ON THE SAME HORIZONTAL LINE.

7. THE EFFECTIVE TEACHING BEHAVIOR ITEMS CIRCLED IN 6 ABOVE CONSTITUTE YOUR PERSONAL TEACHING IMPROVEMENT PRESCRIPTION.

CODE USED IN DESCRIBING INSTRUCTOR'S TEACHING BEHAVIOR:

HARDLY EVER = (1)
OCCASIONALLY = (2)
SOMETIMES = (3)
FREQUENTLY = (4)
ALMOST ALWAYS = (5)

EFFECTIVE TEACHING BEHAVIOR:	N	FREQUENCY DISTR. (1)	(2)	(3)	(4)	(5)	MEAN	SD	PERCENTILE RANK ON EACH EFFECTIVE TEACHING BEHAVIOR CORRELATED (.48 OR HIGHER) WITH PROGRESS ON 1 OR MORE OF THE 7 GENERAL TEACHING OBJECTIVES: 29	30	31	32	33	34	35
THE INSTRUCTOR:															
1. POINTED OUT WHAT WAS IMPORTANT TO LEARN IN EACH CLASS SESSION	66	0	4	2	24	36	4.39	0.82	95	95					
2. GAVE STEP-BY-STEP INSTRUCTIONS WHEN NEEDED BY STUDENTS	66	0	4	4	22	36	4.36	0.85	90	90					
3. STATED THE OBJECTIVES OF THE COURSE	66	0	3	6	13	44	4.48	0.85		95					
4. PROMOTED TEACHER-STUDENT DISCUSSION (AS OPPOSED TO MERE RESPONSE TO QUESTIONS)	65	5	6	20	14	20	3.58	1.24						50	
5. DISPLAYED CONCERN THAT STUDENTS LEARN	66	1	2	3	12	48	4.58	0.84		95					
6. ENCOURAGED SILENT STUDENTS TO PARTICIPATE	64	30	8	17	4	5	2.16	1.30						45	
7. INITIATED CONVERSATION WITH STUDENTS BEFORE AND AFTER CLASS	66	1	3	6	21	35	4.30	0.93						90	
8. ADDRESSED STUDENTS BY NAME	65	4	6	14	27	14	3.63	1.11						40	
9. MADE POSITIVE STATEMENTS ABOUT THE SUBJECT MATTER OF THE COURSE	66	1	1	5	22	37	4.41	0.82	60	90					
10. SPOKE WITH EXPRESSIVENESS AND VARIETY IN TONE OF VOICE	66	1	2	1	11	51	4.65	0.79							
11. INDICATED WHEN A NEW TOPIC WAS BEING INTRODUCED	66	1	0	1	9	55	4.77	0.63		95					
12. USED A VARIETY OF TEACHING TECHNIQUES	65	5	7	19	22	12	3.45	1.15						70	
13. USED A VARIETY OF TEACHING MATERIALS	64	4	12	18	15	15	3.39	1.22				40			
14. USED UNDERSTANDABLE VOCABULARY	66	0	3	0	9	54	4.73	0.69							
15. RELATED COURSE MATERIAL TO REAL-LIFE SITUATIONS	66	0	1	0	8	57	4.83	0.48							
16. USED EXAMPLES TO HELP MAKE A POINT	66	2	0	1	10	53	4.70	0.78		95					
17. SUMMARIZED MATERIAL PRESENTED IN EACH CLASS SESSION	66	4	14	14	16	18	3.45	1.27		70					

18. PRESENTED WELL-ORGANIZED LECTURES	66	0	2	3	12	49	4.64	0.72		95	95			
19. PRAISED STUDENTS DURING CLASS	65	17	16	15	10	7	2.60	1.32						60
20. PROVIDED ANSWERS ALONG WITH OBJECTIVE-TYPE HOMEWORK ASSIGNMENTS	61	37	9	8	4	3	1.80	1.19				40		
21. PROVIDED RELEVANT INFORMATION IN RESPONSE TO STUDENT QUESTIONS	66	2	1	5	11	47	4.52	0.93		90	90			
22. MADE WRITTEN COMMENTS ON OUR PAPERS	62	38	10	9	2	3	1.74	1.13						
23. PROVIDED THE STUDENTS WITH PRACTICE (EXPERIENCE) IN RECALLING FACTUAL KNOWLEDGE (TERMINOLOGY, CLASSIFICATIONS, METHODS, TRENDS)	66	7	16	15	11	17	3.23	1.36		70	70		70	
24. PROVIDED STUDENTS WITH PRACTICE (EXPERIENCE) IN RECALLING FUNDAMENTAL PRINCIPLES, CONCEPTS, OR THEORIES	66	11	11	19	9	16	3.12	1.40			20	20		20
25. PROVIDED STUDENTS WITH PRACTICE (EXPERIENCE) IN LOGICAL THINKING, PROBLEM-SOLVING, AND DECISION-MAKING	66	16	15	13	6	16	2.86	1.51			30	30		30
26. PROVIDED STUDENTS WITH PRACTICE (EXPERIENCE) IN DEVELOPING SPECIFIC PSYCHOMOTOR (MANIPULATIVE, MANUAL) SKILLS	66	34	9	13	2	8	2.11	1.39					1	
27. PROVIDED STUDENTS WITH PRACTICE (EXPERIENCE) IN DEVELOPING SKILLS IN ORGANIZING IDEAS, AND PRESENTING THEM	64	23	12	12	8	9	2.50	1.45				15		10
28. PROVIDED STUDENTS WITH OPPORTUNITIES TO BE CREATIVE (IMAGINATIVE, INVENTIVE, ORIGINAL)	64	24	11	16	4	9	2.42	1.46				40		30

TEACHER PROVIDED QUESTIONS:	N	FREQUENCY DISTR. (1)	(2)	(3)	(4)	(5)	MEAN	SD
36. THE INSTRUCTOR WAS AVAILABLE OUTSIDE OF CLASS TO PROVIDE INDIVIDUAL ASSISTANCE TO STUDENTS – HARDLY EVER, OCCASIONALLY, SOMETIMES, FREQUENTLY, ALMOST ALWAYS.	66	5	6	20	14	20	3.58	1.24
37. TAKEN AS A WHOLE, THE COURSE WAS POOR, FAIR, AVERAGE, GOOD, EXCELLENT	65	5	7	19	22	12	3.45	1.15
38. THE EXAMINATIONS, QUIZZES, OR PAPERS CLOSELY RELATED TO THE IMPORTANT CONCEPTS OF THE COURSE – STRONGLY DISAGREE, GENERALLY DISAGREE, UNDECIDED, GENERALLY AGREE, STRONGLY AGREE.	64	30	8	17	4	5	2.16	1.30

V. Conclusions and Implications

The following conclusions and implications were made and interpreted within the framework of the basic assumptions underlying the study.

A. Conclusions

1. The 7 general teaching objectives generated by this study are appropriate for describing the important purposes of most college courses. They are:

- Gaining factual knowledge (terminology, classifications, methods, trends).
- Learning fundamental principles, concepts, or theories.
- Improving logical thinking, problem-solving, and decision-making abilities.
- Developing specific psychomotor (manipulative, manual) skills.
- Developing a favorable attitude toward the subject matter.
- Developing creative (imaginative, inventive, original) capabilities.
- Developing skills in organizing ideas and presenting them in written and oral forms.

2. At least 28 specific, low inference, observable college teaching behaviors are highly associated with student achievement on *1* or *more* of 7 general teaching objectives. However, none is highly associated with achievement on *all* objectives studied. Furthermore, of the teaching behaviors studied, the most important one is providing students with practice in whatever is the desired learning outcome. The 28 teaching behaviors are:

- Pointed out what was important to learn in each class session.
- Gave step-by-step instructions when needed by students.
- Stated the objectives of the course.
- Promoted teacher-student discussion (as opposed to mere response to questions).
- Displayed concern that students learn.
- Encouraged silent students to participate.
- Initiated conversation with students before and after class.
- Addressed students by name.
- Made positive statements about the subject matter of the course.
- Spoke with expressiveness and variety in tone of voice.
- Indicated when a new topic was being introduced.
- Used a variety of teaching techniques.
- Used a variety of teaching materials.
- Used understandable vocabulary.
- Related course material to real-life situations.
- Used examples to help make a point.
- Summarized material presented in each class session.
- Presented well-organized lectures.
- Provided the students with practice (experience) in recalling factual knowledge (terminology, classifications, methods, trends).
- Provided students with practice (experience) in recalling fundamental principles, concepts, or theories.
- Provided students with practice (experience) in logical thinking, problem-solving, and decision-making.
- Provided students with practice (experience) in developing specific psychomotor (manipulative, manual) skills.
- Provided students with practice (experience) in developing skills in organizing ideas and presenting them.
- Provided students with opportunities to be creative (imaginative, inventive, original).
- Praised students during class.
- Provided answers along with objective-type homework assignments.
- Provided relevant information in response to student questions.
- Made written comments on our papers.

3. Student self-ratings of progress on objectives valued by the instructor as well as their description of their instructor's teaching behavior are highly reliable.

4. The validity of student self-ratings of progress on objectives valued by instructors, as a criterion measure of achievement, has been enhanced by the findings of this study.

B. Implications

Three products of the study, the *Instructor Form,* the *Student Form,* and the *Instructor's Printout,* have a number of implications for the improvement of college teaching. These products can be effective for (1) identifying the strengths and weaknesses of an individual instructor's teaching, (2) prescribing appropriate specific remedies, and (3) supplying appropriate evidence concerning an instructor's effectiveness to those members of the faculty and administration involved in decisions concerning his or her promotion. And given extensive usage at a particular institution, they can supply a description of the "state of the art" that will suggest a rationale for ascertaining the need, content, and clientele for staff development programs and for the generation of instructional materials for the improvement of college teaching.

In addition, the rationale and methodology of the study may have important implications for two groups of investigators: those seeking to determine the relationships between additional teaching behaviors and positive college student learning outcomes and those seeking justification for the inclusion of any given teacher competency in a competency-based teacher education program.

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Appendix A. Original instructor form used during the development phases of the project*

CORNELL UNIVERSITY AGRICULTURAL EXPERIMENT STATION
HATCH PROJECT NO. 137407

A Diagnostic Observation and Reporting System for
Student Description of College Teaching

INSTRUCTOR FORM

Please fill out a separate copy of this form for each lecture, discussion, and laboratory section.

COURSE NUMBER: _____ MEETING SCHEDULE OF THIS SECTION OF COURSE (e.g., 9:00 MWF):

_____ Hour _____ Days

NAME OF INSTRUCTOR (Print): _____
(Last) (First) (Middle Initial)

COLLEGE: _____ DEPARTMENT: _____

OFFICE ROOM NUMBER AND BUILDING: _____

CITY _____ STATE: _____ ZIP: _____

I. Read carefully the following seven general teaching objectives for undergraduate courses. Rate each in terms of its importance for this section of your class, using the code which follows:

A. Not important
B. Of no more than minor importance
C. Important
D. Very important
E. Absolutely essential

Circle One:

A B C D E	1.	Gaining factual knowledge (terminology, classification, methods, trends).
A B C D E	2.	Learning fundamental principles, concepts, or theories.
A B C D E	3.	Improving logical thinking, problem-solving, and decision-making abilities.
A B C D E	4.	Developing specific psychomotor (manipulative, manual) skills.
A B C D E	5.	Developing a favorable attitude toward the subject matter.
A B C D E	6.	Developing creative (imaginative, inventive, original) capabilities.
A B C D E	7.	Developing skills in organizing ideas and presenting them in written and oral forms.

II. Number of students enrolled in section: _____
III. Type of grading system used (check one): _____ Letter; _____ Numerical; _____ Pass/Fail
IV. Number of quizzes given this term to date: _____
V. Number of examinations given this term to date: _____
VI. Number of weeks in this term already passed: _____

THANK YOU FOR YOUR ASSISTANCE

For Office Use Only
CODE NUMBER
Col. Dept. Instructor Section

* See figure 1 on page 15 for the current version of the Instructor Form.

Appendix B. Original student form used during the development phases of the project*

CORNELL UNIVERSITY AGRICULTURAL EXPERIMENT STATION
HATCH PROJECT NO. 137407

A Diagnostic Observation and Reporting System for
Student Description of College Teaching

DO NOT WRITE ON THIS FORM

Your Help Is Needed

USE SEPARATE ANSWER SHEET

We are in the process of constructing an observation and reporting system which can be used by college students to assist their instructors in improving their teaching. Please give thoughtful and honest responses to the statements which follow. Respond to all statements even though, in some cases, none of the alternatives expresses your reaction exactly.

Record all responses on the special answer sheet by blackening only the appropriate space with a *No. 2 pencil.* Be sure to *erase* errors completely.

Part I. Describe the teaching behavior of your instructor by using the following code:

A = Hardly ever
B = Occasionally
C = Sometimes
D = Frequently
E = Almost always

The Instructor:

1. Described at the beginning of each class session what he planned to do.
2. Pointed out what was important to learn in each class session.
3. Gave step-by-step instructions when needed by students.
4. Stated the objectives of the course.
5. Discouraged students from expressing themselves freely and openly.
6. Promoted teacher–student discussion (as opposed to mere response to questions).
7. Displayed concern that students learn.
8. Encouraged silent students to participate.

9. Initiated conversation with students before and after class.
10. Addressed students by name.
11. Made positive statements about the subject matter of the course.
12. Spoke with expressiveness and variety in tone of voice.
13. Indicated when a new topic was being introduced.
14. Used a variety of teaching techniques.
15. Used a variety of teaching materials.
16. Used understandable vocabulary.

17. Presented course material at too slow a pace.
18. Brought needed materials to class.
19. Met with students to give individual assistance with course work.
20. Related course material to real-life situations.
21. Used examples to help make a point.
22. Presented course material at too fast a pace.
23. Moved around the classroom.
24. Used gestures while teaching.

25. Used visual aids to complement oral presentations.
26. Summarized material presented in each class session.
27. Presented well-organized lectures.
28. Required more work per credit hour than other instructors.
29. Reviewed the material to be included in exams.
30. Provided the students with practice (experience) in recalling factual knowledge (terminology, classifications, methods, trends.)
31. Provided students with practice (experience) in recalling fundamental principles, concepts, or theories.
32. Provided students with practice (experience) in logical thinking, problem-solving, and decision-making.

33. Provided students with practice (experience) in developing specific psychomotor (manipulative, manual) skills.
34. Provided students with practice (experience) in developing skills in organizing ideas and presenting them.
35. Provided students with opportunities to be creative (imaginative, inventive, original).
36. Gave exams with balanced coverage of major topics.
37. Gave ungraded tests on new material before teaching that material.
38. Was harshly critical of student responses.
39. Praised students during class.
40. Provided answers along with objective-type homework assignments.

41. Provided relevant information in response to student questions.
42. Stated the question and the correct answer when reviewing tests.
43. Reminded students of up-coming quizzes/exams.
44. Threatened to make us rewrite inadequate work.
45. Made written comments on our papers.

Part II. Compare the progress you have made in this course with that made in other courses you have taken at this college or university, using the following code:

A = Lowest 10% of courses I have taken here
B = Next 20%
C = Middle 40%
D = Next 20%
E = Upper 10%

Your progress in:

46. Gaining factual knowledge (terminology, classifications, methods, trends).
47. Learning fundamental principles, concepts, or theories.
48. Improving logical thinking, problem-solving, and decision-making abilities.

49. Developing specific psychomotor (manipulative, manual) skills.
50. Developing a favorable attitude toward the subject matter.
51. Developing creative (imaginative, inventive, original) capabilities.
52. Developing skills in organizing ideas and presenting them in written and oral forms.

* See figure 2 on page 17 for the current version of the Student Form.

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